

# Integration of Magneto-Optical Materials for Novel Optical Devices & Magnetophotonic Crystals, Phase II

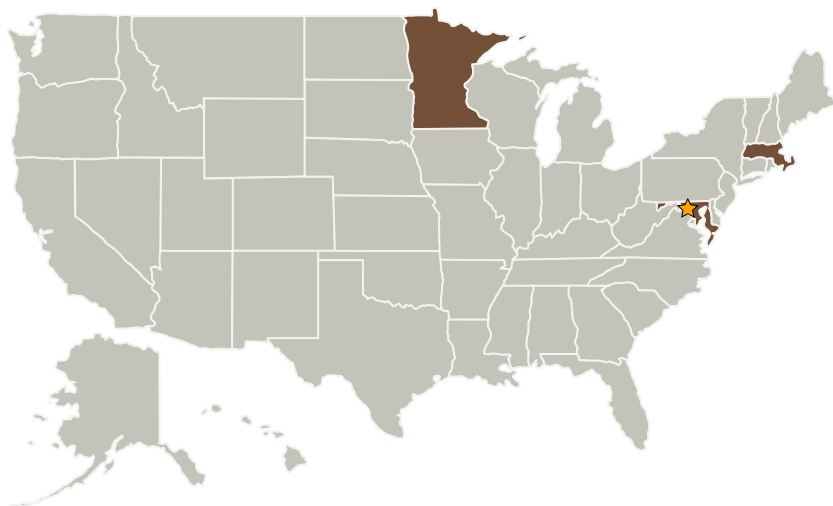
Completed Technology Project (2004 - 2006)



## Project Introduction

This work proposes to capitalize on our Phase I success in monolithically integrating magneto-optic and magnetic materials with semiconductor platforms in order to reduce the size and weight, as well as increase the performance, of NASA's strategic optical systems. Nonreciprocal components play extremely important role in laser systems and telecommunications. Currently all such components are discrete; there are no fully monolithically integrated nonreciprocal components available in the market. This work will use a novel technique, metallorganic chemical liquid deposition (MOCLD) to achieve this feat. Phase I results have demonstrated the feasibility of this technique in fabricating doped and undoped magneto-optic films, as well as buffer layers, onto semiconductors. Permanent magnet films were also grown with sufficient strengths to bias the magneto-optic films for fully integrated waveguide isolators. All of these materials will be optimized during initial fabrication/characterization tasks in the Phase II program. Also, prototype devices will continue to be simulated using the beam propagation method. These simulation results will allow a fast path toward fabricating prototype devices with minimal processing/testing iterations. Photonic circuitry with electric and magnetic drives and magnetophotonic crystals will also be designed and developed in this Phase II program.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Boston Applied Technologies, Inc.	Supporting Organization	Industry Minority-Owned Business	Woburn, Massachusetts
University of Minnesota-Twin Cities	Supporting Organization	Academia	Minneapolis, Minnesota

## Primary U.S. Work Locations

Maryland	Massachusetts
Minnesota	

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Project Manager:

Hossin Abdeldayem

## Technology Areas

### Primary:

- TX14 Thermal Management Systems
  - └ TX14.1 Cryogenic Systems
    - └ TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors